FIJI NATIONAL UNIVERSITY

COLLEGE OF AGRICULTURE, FISHRIES AND FORESTRY (CAFF)

Department of Soil Science & Agricultural Chemistry

School of Agricultural Sciences

Bachelors of Science in Agriculture –Year 1

FINAL EXAMINATION: 2017

Trimester I, 2017

SAC 503 INTRODUCTION TO SOIL SCIENCE

TOTAL MARKS: 50 **TIME DURATION: 3:10 HOURS**

This paper consists of six (6) pages. Please check to see that your paper is complete.

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes extra reading time in which you are NOT permitted to write.
2. Attach all the sheets used as your answer paper in their correct sequence and secure with a string.
3. Use both sides of the answer sheet and write your candidate number on each sheet.
4. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
5. Candidates are not allowed to carry any textual material, printed or written material, bits of papers, inside the Examination Room/Hall

"MOBILE PHONES ARE STRICTLY NOT ALLOWED"

SECTION	PARTICULARS	TOTAL MARKS
A	**Part 1: Fill in the Blanks**	**20**
	Part 2: True and False **Part 3: MCQ** **Part 4: Short answers**	
B	**Part 5: Long answers**	**30**
	Total	**50**

SECTION A:

PART 1

FILL THE BLANK: **(10X0.5=5 MARKS)**

1. The texture of the soil is determined by---------- method in Lab.
2. ----------soils are developed on unconsolidated sediments like alluvium, colluvium or Aeolian material.
3. ----------approach studies the soil as a natural habitat for plants. It considers the various properties of soil from the standpoint of higher plants.
4. ----------is a natural process of breakdown and transformation of rocks and minerals into unconsolidated residues, called regolith.
5. ----------Igneous rocks have been formed when the molten mass was cooled and consolidated beneath the surface.
6. ----------horizons are dominated by organic materials derived from the accumulation of dead plant and animal matter (litter) at varying stages of decomposition.
7. ----------the amount of water held in soils at which plants start to wilt. The moisture content is not sufficient for plants to maintain turgor.
8. ----------substitution is the replacement of one atom by another of similar size but lower valence.
9. ---------- factors are represented agent that supply energy that act upon the mass for process of soil formation. They are climate and biosphere.
10. ----------is an important types of metamorphic rocks that are sources of weathered parent materials for soil formation.

PART 2 (10X0.25=2.5 MARKS)

MATCH THE FOLLOWING

COLUMN "A"		COLUMN "B"
1. Bulk density		A. Kaolinite
2. Particle density		B. Chlorites
3. 1:1 Type Mineral		C. Colluvial
4. 2:2 or 2:1:1 layer silicates mineral		D. Eolian
5. Mollisols		E. Glacial
6. Group of similar pedons		F. Soil pedon
7. smallest sampling unit		G. Soil Orders
8. Parent material transported by gravity		H. mass per unit volume of the solid portion of soil
9. Parent material transported by wind		I. polypedons
10. Parent material deposited by ice		J. oven dry weight of a unit volume of soil inclusive of pore spaces
		K. deposits

PART 3 : **(10X0.25=2.5 MARKS)**

WRITE THE LETTER OF YOUR CHOICE (EACH 0.5 MARK)

1. An ideal soil contains a mineral fraction, organic matter, water and_____.

a. rocks

b. colluvium

c. air

2. By definition a soil must_____

a. Contain living matter

b. Contain rocks

c. Both of the above

3. Which of the following is an igneous rock?

a. Gneiss

b. Feldspar

c. Granite

4. Soil bulk density relates the oven dry weight of solids to total volume of soil. How is bulk density calculated?

a. Weight of oven dry soil / Volume
b. Volume / Weight of oven dry soil
c. Weight of oven dry soil X Volume

5. The smallest volume that represents the range of characteristics of a soil in the landscape is_____.

a. Ped
b. Pedon
c. Order

6. Soil consistence refers to_____.

a. The degree of plasticity and stickiness of a soil
b. Movement of air and water through soil
c. The occurrence of similar soil profiles in similar landscape positions

7. A two-dimensional vertical section of a soil showing its horizons is a_____.

a. Profile
b. Pedon
c. Polypedon

8. An example of a primary mineral is_____.

a. Granite
b. Feldspar
c. Clay

9. Quantification of soil color using the Munsell notation is _____.

a. Chroma ,Hue, Value,
b. Hue, Value, Chroma
c. Value, Hue ,Chroma

10. The finest of all soil particles are called _____.

a. clays
b. silts
c. sand

PART 4 : (5X2=10 MARKS)

Note: Attempt any FIVE (5) questions only.

Differentiate the following terms:

1. Bulk density and particle density
2. Soil texture and soil structure
3. eluviation and illuviation
4. rocks and minerals
5. pedology and edaphology
6. soil profile and soil horizons
7. field capacity and capillary water.

SECTION B

PART 5

Descriptive Type Questions (5X6=30 Marks)

Note: Attempt any FIVE(5) questions only. All carries equal 6 marks

1. **In the Rocks cycle explain the following**
   a. Draw and briefly explain the Rock cycle
   b. Discuss how a metamorphic rock could become a sedimentary rock.
   c. What are the igneous rocks?

2. **In reference to the Rocks and minerals explain the following**
   a. What do you understand by weathering of rocks and minerals?
   b. Give the list of physical weathering agents.
   c. Give the list of chemical weathering agents.

3. **In the the physical properties of soil explain the following:**
   a. Soil structure
   b. Factors affecting soil temperature
   c. Soil colour and density of soil

4. **What are the importance of soil water (list only)**
   a. Briefly explain the physical classification of soil water.
   b. What do you understand with available water?
   c. What are soil factors that affect availability of soil water?

5. **In the Soil colloids explain the following :**

   a. What do you understand colloidal system and colloid?
   b. What is cation exchange capacity
   c. Factors that affect cation exchange capacity.

6. **In the Soil Formation explain the following :**

   a. Draw the diagram of soil profile. Label and describe the different horizons in soil profile.
   b. What do you understand Organic and mineral horizons?
   c. Explain the four process of soil formation

7. **Numericals :Solve any one(1) of the following:**

   a. The mass of a moist sample of soil is 25 gm. when measured on a tin lid of mass 16 gm. After drying in an oven for 24 hours at 105°C, the mass of the tin and sample is 23 gm. Calculate the moisture content of the soil.
   b. A soil sample has a weight of 0.7 kg and the volume was found to be 3.5 × 10-4 m^3. After drying out the weight was reduced to 0.6 kg. The particle specific gravity test gave 2.6.

      Determine the following :(a) Moisture content (b) Dry density(c) Bulk density

END OF EXAMINATION PAPER